MEDICAL EXAMINER.

DEVOTED TO MEDICINE, SURGERY, AND THE COLLATERAL SCIENCES.

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Remarks on the Heart in its normal condition—its situation, size, weight, sounds, and their causes, etc. By C. W. Pennock, M. D., Physician to the Philadelphia Hospital, Blockley.

To the Editors of the Medical Examiner.

Gentlemen,—Intending to communicate, in a future number of the Examiner, several cases of disease of the heart, I have thought it proper, for the more perfect understanding of the physical signs upon which the diagnosis of cardiac diseases is founded, to present a few preliminary remarks, respecting the heart in its normal condition.

Yours, etc. C. W. Pennock.

Previous to entering upon the subject of the diseases of the heart, it is of great importance that we should be acquainted with the exact situation of that organ, with that of its valves, the normal thickness of its walls, the dimensions of its several compartments, and its relative size to that of the whole frame. The object of this communication will be, therefore, briefly to indicate these several facts, and to present some views respecting the causes of the normal sounds of the heart—a subject which, for some years past, has claimed great attention from European pathologists, but which, in this country, has not been properly appreciated.

First, of the situation of the heart. If a vertical line be drawn from the second rib along the left margin of the sternum, one-third of the heart, consisting of the right auricle and one-third of the upper portion of the right ventricle, will be observed to be on the right; and two-thirds, composed of the lower portion of the right ventricle, and the whole of the left section of the heart, will be seen on the left. The apex beats two inches below the left nipple, and one inch on the sternal side. A needle passed into the chest at the upper edge of the cartilage of the fifth rib close to its costal extremity, enters the septum of the ventricles. The point of the heart is about an inch and a half below this, and to the left.

Nearly the whole of the anterior surface of the heart is formed by the right auricle and ventricle—a small portion only of the left ventricle, and its point, form part of that surface. The left auricle, and greater portion of the left ventricle, are posterior.

The lungs overlap the base of the heart, and, receding from each other, leave a portion of the heart, from one and a half to two inches square, in immediate contact with the sternum. This space, upon percussion, yields a flat sound; the remaining portion of the heart which is covered by the lungs, may be accurately determined by percussion, inasmuch as a solid body, situated beneath one which is resonant, modifies the degree of resonance of the latter. In order to measure the extent of the heart, strong percussion between the ribs, over the præcordial region, is necessary; and the preferable mode of procedure is, to commence the percussion upon the sternum, where the sound is flat, and continue it laterally to the left, until the resonance becomes distinct. In numerous instances, we have measured the heart in this way, and needles forced into the chest at the points where dulness of sound ceased, have shown that the measurement was rigidly accurate.

As the heart is attached only at the origin of the great vessels, the body and apex are free and moveable, and are influenced by the motions of the diaphragm, or by the distention of the abdomen; hence, it is important, that the fixed points of the aortic and pulmonary valves should be accurately known. To determine the precise situation of these valves, we have repeatedly forced long needles (from six to eight inches in length) into given points of the chest, perpendicular to the plane of the thorax. We have thus ascertained that the *semilunar valves of the aorta* lie immediately under the centre of the sternum, opposite the junction of the cartilage of the third ribs with that bone; *the pulmonary valves* are one-fourth of an inch to the left, at the lower edge of the cartilage of the second rib.

The aorta, from its origin, inclines in its course upwards, towards the right side of the sternum, in which direction it extends seven-eighths of an inch from the middle line of that bone. The right border of the pulmonary artery corresponds with the middle of the sternum, opposite the upper edge of the second rib; it then inclines to the left, passes around the aorta, filling the concavity of its arch; at its exit from beneath this vessel, its upper border is half an inch to the left of the middle of the sternum.

From the circumstance of the body of the heart being moveable, the mitral and tricuspid valves are not uniformly found in the same position. In several instances in normal hearts, we have found the *mitral valves* at the lower margin of the cartilage of the third rib, one-half of an inch to the left of the sternum; the *tricuspid valve* has been frequently observed under the sternum, opposite the cartilages of the fourth ribs. These points may be considered as the situations of the auriculo-ventricular openings, when the body is in a recumbent posture, and at the moment of expiration; when the individual is standing, or when inspiration takes place, the situation of these valves, in relation to the parietes of the thorax, will be changed.

Size of the heart. Lænnec considered it impos-

sible to arrive at any great accuracy in the measurement of the size of this organ; he gave, as an approximation to its dimensions, that of the closed fist of the individual. This, for practical purposes, is very useful, but the measures of the heart by M. Bouillaud are much more accurate. My measurements of the heart have coincided nearly with those of Monsieur B. I will therefore give all his measures, except those of the right and left ventricles, which are slightly greater than mine. The following is the average of the measurement of the normal heart, agreeably to the author just mentioned.

Circumference measured at the base of the ventricles, 9 inches.

Length of the heart, from the origin of the aorta to the apex, 3 inches 10½ lines.

Breadth of the heart, from one border to the other, immediately below the base of the ventricles, 3 inches 11 lines.

It will be here observed, that the length and breadth of the heart are very nearly equal.

Thickness of the heart, represented by a line passing from the anterior to the posterior surface at its base, 2 inches 1 line.

Measurement of the thickness of the several walls of the heart.

Thickness of the left ventricle at its base, 7 lines.

Thickness of the right ventricle at its base, 2 4-5 lines.

These two last measurements are greater than I have usually found in healthy hearts. Six and a half lines for the measurement of the thickness of the left ventricle, and two lines for that of the right, are, I should say, more exact, (always excluding the columnæ carneæ.) The relative thickness of the ventricles, in general terms, may be stated as one to three.

Measurement of the auricles.

Thickness of left auricle, 1 3-5 lines.
Thickness of right auricle, 1 1-10 lines.

Measurement of the circumference of the orifices of the different valves.

Circumference of the mitral valve, 3 inches 9 lines.

Circumference of the tricuspid valve, 4 inches 1 line.

Circumference of aortic valves, 2 inches 6½ lines.

Circumference of pulmonary valves, 2 inches 10 lines.

From the above, it will be seen that the orifice of the tricuspid valve is greater than the mitral, and that that of the pulmonary valve exceeds the aortic; often, however, this difference is not found.

The circumference of the valves having been stated, the diameters of the orifices are readily ascertained: in order to conclude this part of the subject, it is only necessary to give the

Width of the valves.

Width of the tricuspid valve, 9¾ lines.

This valve, in its healthy state, is very thin—thinner than fine India paper.

Width of the mitral valve, 8¾ lines.

This valve is two-thirds thicker than the tricuspid, being equal to the thickness of thin letter paper.

Width of the semi-lunar valves of the pulmonary artery, 6 lines.

Width of the semi-lunar valves of the aorta, 6⅓ lines.

These valves frequently are precisely equal—the valves are transparent; those of the pulmonary artery are thinner and more delicate than those of the aorta.

Capacity of the ventricles and auricles.

The capacity of the several compartments of the heart are nearly equal; those of the right side of the heart are, however, rather greater than those of the left. In general terms, the different cavities of the heart would hold a hen's egg of ordinary size.

Weight, bulk, and relative size of the Heart.

Dr. Clendenning has investigated these subjects with great zeal and industry. The field of his research has been more ample than that of his predecessors; and after examining and weighing nearly four hundred hearts, he gives the following result of his observations:—"The normal heart may be assumed to average for the whole life, above puberty, about 9 oz. in absolute weight, and 8½ oz. in bulk, for the male; and 8 oz. or a little more in weight, and 7½ oz. or a little more in bulk, for the female; and to bear after death to the person, for the male, the rates of about 1 to 160, and for the female, of 1 to 150."*

Sounds of the Heart.

We now arrive at one of the most important and interesting questions in physiology, namely, the causes of the sounds of the heart.

Upon applying the ear to the region of the heart, two successive sounds are heard, followed by an interval of silence. The first is a dull, slow sound, succeeded immediately by a short, quick one, which is followed by a short pause.

Whilst the ear is applied to the præcordial region, and the finger is placed on the radial artery, it will be found that the impulse of the heart, dull sound, and the pulsation at the wrist, are synchronous. This correspondence of movement, sound and pulse, shows that the phenomena are owing to the contraction of the ventricles. Immediately after this dull sound, a louder, clearer, quick, and abrupt sound, (the second,) is heard, unaccompanied by any impulse, and is similar to the clicking of a small valve, or the lapping of a dog. Next follows the interval of repose.

The relative time, or rhythm, occupied by these sounds, and the period of repose, is as follows: If the whole time be a second, then the impulse and first sound will be half a second.

The second, or valvular sound, one-fourth of a second, and the period of repose also a quarter of a second.

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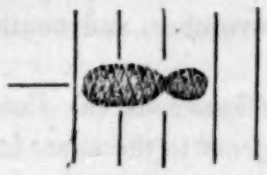
* Clendenning, Croonian Lectures for 1838.

The measure of time may be represented by this diagram. (*Williams.*)



Lænnec, who first noticed these sounds, attributed the first to the ventricular contraction; this unquestionably is true, as the impulse, this dull sound, and the pulse, are synchronous. The second, or clicking sound, was attributed by this great man to the contraction of the auricles. This explanation of the cause of the second sound was unsatisfactory, inasmuch as the auricular contraction preceded the ventricular, and consequently his theory, as regarded the second sound, was erroneous.

Every thing respecting this subject was obscure, until the brilliant experiments of Dr. Hope on the heart's action were instituted, in 1830 and 1831, and subsequently repeated by him, Dr. Williams of London, and several committees of the British Association of Physicians. The observations of these physiologists were made upon living animals of various sizes,* after they had been deprived of sensation, whilst respiration was maintained by artificial means. The chest and pericardium being laid open, they were enabled to inspect and feel the movements, and, at the same time, hear the sounds of the heart, and thus ascertain with what motions the sounds coincided. The result of these inquiries has been, the establishment of the following facts:

First. That before the pericardium was opened, both sounds were distinctly heard.

Second. Both were also distinctly heard, though the lung was interposed between the heart and ear.

Third. The auricles, by a vermicular and slight action, *unattended by any sound*, contract immediately before the ventricles.

Fourth. The ventricular contraction, impulse, pulse in the arteries near the heart, and the first or dull sound, were seen, felt, and heard, to be simultaneous.

Fifth. The ventricular systole was immediately followed by the diastole, during which the second, or short clear sound, occurs.

Sixth. Succeeding the diastole is the interval of rest, towards the conclusion of which, the auricles contract, and the same series of movements recur.

Seventh. During the ventricular systole, the convexity of the ventricles became depressed, bringing the apex into forcible contact with the ribs, and thus produced the impulse.

Eighth. The first, or dull sound, was more distinct over the bodies of the ventricles than elsewhere. This sound remained when the auricles were opened; it continued, though somewhat diminished, when the finger was forced through the auriculo-ventricular opening, or when the mitral and tricuspid valves were destroyed. Severing the heart from the arteries did not destroy the sound.

Ninth. About two to three inches (on the ass) up the aorta from its origin, the second sound was heard, (but not the first,) alternating with the impulse as felt on the ventricles. It was decidedly more distinct over the origin of the aorta and pulmonary artery, than on the body of the ventricles. When the aorta and pulmonary arteries were compressed between the fingers, the first sound was accompanied by a loud murmur, and the second was stopped. When a dissecting hook was passed into the pulmonary artery, so as to prevent the closure of the semi-lunar valves, the second sound was impaired, and a hissing murmur accompanied it. A hook having been passed into the aorta, so as to prevent closure of its valves, the second sound was replaced by a prolonged hissing. Upon withdrawing the hooks, the second sound returned, and the hissing ceased.

From these experiments, the following inferences may be drawn:

First. That the contraction of the auricles have no influence in the production of the first sound.

Second. That the first sound of the heart depends on the muscular contraction of the ventricles, *accompanied probably* by a degree of valvular sound, caused by the closure of the mitral and tricuspid orifices.

Third. That the second sound is caused by the reaction of the arterial columns of blood, tightening and closing the semi-lunar valves at the ventricular diastole.

The preceding facts in respect to the relative intensity of the sounds over different portions of the heart, may be verified by ausculting the human chest;—thus, the first sound, which, in the experiments just alluded to, was heard loudest upon the body of the exposed ventricles, is also heard loudest upon ausculting the thorax over the space coinciding with the ventricle. The second sound, also, is heard more distinctly over the situation of the semi-lunar valves, opposite the cartilages of the second and third ribs, especially those of the right side, which are over the aortic valves, and along the course of the ascending aorta, than elsewhere.

It will be observed that the investigations reported, render it probable that the first sound is modified by the closure of the auriculo-ventricular valves. This opinion is strongly insisted on by Dr. Hope, who observes, that although the general character of the first sound be dull, yet, at its commencement near the base of the heart, there is a sudden, quick, and valvular sound, preceding, but lost in the dull muscular sound. This I have remarked in some cases of hypertrophy of the ventricles, where the contractions are slow, and the valves, though thickened, elastic.

The result of the previous investigation disproves several favourite theories; allusion will only be made to some few of the most popular. Among these is that of Magendie, who asserts

* The animals subjected to vivisection were principally asses, dogs, and young calves—the latter, having great tenacity of life, were considered as preferable to all other of the smaller quadrupeds.

that the first sound is occasioned by the rubbing of the heart against the sternum;—this was disproved by the fact, that this sound was clearly heard through a portion of interposed lung, after the anterior parietes of the chest had been removed.

By Mr. Carlisle, the first sound has been ascribed to the rush of blood into the great arteries: this was disproved, inasmuch as, when the auricles were laid open, the mitral and tricuspid valves destroyed, the arteries cut off, yet the first sound was still heard.

Mons. Rouanet attributes the first sound to the closure of the auriculo-ventricular valves: the closure of these valves has probably some influence in modifying the sound, but does not produce it, as its peculiar dull character exists after their destruction.

The investigations which we have just mentioned, have been carried forward by the brightest medical talent of Great Britain—by men, no less distinguished for their love of truth, than for their ardour in physiological investigation; and all their communications on the subject bear the evidence of great candour. Under such circumstances, implicit reliance may be given to their reports. As collateral evidence of the correctness of their views, the diagnosis founded on their explanation of the sounds of the heart, is generally verified by post mortem examinations.

I am aware that opposing views have been given, but the mass of evidence appears strongly in favour of the British physiologists. It may be advisable that the investigations should be repeated, and the writer indulges the hope, that, aided by some of his medical friends, he may undertake it. The attempt was made by them some time ago, but circumstances above their control prevented the completion of their design.

FOREIGN CORRESPONDENCE.

DUBLIN, 20*th June*, 1839.

To the Editors of the Medical Examiner.

GENTLEMEN,—The high reputation of the Dublin medical schools and of their professors, induces me to send you a few hasty observations respecting them, which I was enabled to make during a recent visit. Connected with the University, is the

School of Anatomy, Trinity College, a commodious building in the College Park, including the anatomical and chemical theatres. In the anatomical section there is a beautiful dissecting room, admirably lighted and ventilated, with a fountain and troughs in the centre. There is a private dissecting room also. The lecture room is sufficiently spacious to accommodate four hundred students; and here the anatomical, physiological, pathological, and surgical lectures are delivered. The college museum is scanty. The students have the use of a good library, on the payment of a small sum. The lectures commence on the first Monday in November, and continue till the last of May.

The *College of Physicians, Sir Patrick Dun's*, is similar in its objects to the same institution in London, and need not detain us.

The *Royal College of Surgeons*, on the west side of Stephen's Green, is a fine building, with a Doric façade, of mountain granite. The columns of Portland stone rest on a rustic basement, and support an elegant pediment, surmounted by three statues—Esculapius, Minerva, and Hygeia. In the tympanum of the pediment, are the royal arms. The interior is conveniently arranged, and contains a board room, for the meetings of the college; a library, with a good selection of works on medicine, surgery, and natural history; an examination hall, and numerous smaller apartments. There are also four lecture rooms, a laboratory, and several dissecting rooms. There are *three* museums. One is eighty-four feet long, by thirty broad, and thirty-six in height, with a gallery. This is appropriated to a large and well-arranged set of human and comparative anatomical preparations, wet and dry. The second museum, twenty-four feet square, and thirty-six high, with a double gallery, contains the pathological specimens, and an excellent collection of wax models, the gift of the Duke of Northumberland. The other is small, in which are the models and specimens used in the daily demonstrations. The candidates for a surgical license are obliged to study five years, to attend a certain number of courses on anatomy, physiology, surgery, chemistry, practice of medicine, materia medica, midwifery, and medical jurisprudence. They are publicly examined for two separate days, very rigorously, on all these branches. If rejected, the candidate may appeal to another court of examiners, differently constituted; and, if rejected by them, is obliged to extend his probation one year. Half yearly examinations of the registered pupils are held, and each candidate is obliged to show that he has answered four such, ere he can be eligible to the final one for his diploma. The lecture term embraces six months.

Attached to the *House of Industry*, in North Brunswick st., an immense establishment, capable of accommodating nearly two thousand *inmates*, is the *Richmond Surgical Hospital*, containing one hundred and twenty beds. The patients are admitted by the surgeons according to the urgency

of the case, without reference to recommendation. The building is an ancient nunnery, and is badly adapted to its present more useful purpose, the wards being low and small. Much attention appears, however, to be paid to cleanliness and ventilation, and, considering the crowded state of the wards, with tolerable success. The operating theatre is of good size, and well lighted. The museum, commenced by Prof. Tod, of King's College, London, is indebted for its present prosperous condition to the indefatigable exertions of R. W. Smith, Esq., the accomplished surgical lecturer at the Richmond School. Although the collection cannot pretend to vie in extent with that of the College of Surgeons, it is far more valuable. It is comprised entirely of pathological specimens. The history of each case is known and registered; and there are casts and drawings of most of them, admirably executed by individuals retained exclusively for its use. Here I examined the preparations of congenital dislocations of the shoulder-joint, the subject of a novel and excellent essay, by Mr. Smith, in the last number of the Dublin Journal. Also, the specimens of rheumatic disease of the joints, so ably described in Tod's Cyclopædia, by R. Adams, Esq., of this city.

The *Pathological Society of Dublin*, promises to become a most valuable institution. Though recently established, so great has been the ardour and industry of its members, and so ample the materials, that a volume of transactions may very soon be expected. This will be illustrated by plates of the most important specimens. Each preparation has its history attached, with casts and drawings. No where in America does a more ample field exist for the establishment of a society of this description than in Philadelphia; and were it once commenced, I have not the least doubt would become one of our most cherished and important institutions. Boston already has a society of the kind, and great advantages have been found to arise from it; and, under the care of its indefatigable curator, Dr. J. B. S. Jackson, will assume before long an importance commensurate with its usefulness.

I this morning examined at Mr. Adams's, an undoubted specimen of united fracture of the neck of the femur, within the capsule. This occurred in an old female pauper, in the House of Industry, some time since. Nothing was done, and on her dying after a few months, complete ossific union was found to have taken place. The case will be detailed in the forthcoming number of the Cyclopædia of Anatomy and Physiology, *Art.* Hip-joint, by Mr. A. It is not to be regarded as contradictory of Sir Astley Cooper's views as to the rareness of reunion in such cases. In 1834, Sir Astley addressed a note to the Editor of the Medical Gazette, with the view, as he stated, of correcting an assertion of the late Baron Dupuytren's, that he (Sir Astley) had declared reunion, in cases of fracture entirely within the capsule, to be impossible. He does not deny the possibility of union, but only regards it as rare. He considers the difficulty of a false position, and not deficient nourishment, to be the obstruction to union, and adds, that where the synovial membrane is unruptured, union will occur, giving as illustrative a case of Mr. Swan's. Mr. Adams's case is exactly like that of Mr. Swan's, the rupture of the sac being limited to one side, and in that spot there is no ossific deposit. The preparation and case are highly interesting.

Mr. Adams is one of the surgeons to the Richmond Hospital, and an excellent practitioner and operator. He showed me the results of several operations for club-foot, which he had recently performed, and with success. The treatment of surgical cases is very similar to our own, though they appear to admit less readily than we do new and unestablished methods of treatment. Davat's operation for varicose veins, and Velpeau's iodine injection in hydrocele, I could not discover had yet been tried in any of their surgical hospitals. Their fracture treatment is still defective. I have had no opportunities of witnessing any operations. The same neatness and excellent ventilation, and large wards, and comfortable beds, as with us, are not seen in most of the Dublin hospitals. Great attention, however, appears to be paid the patients, and the manner of the visiting medical attendants is patient and kind.

Very respectfully yours, M. C.

THE MEDICAL EXAMINER.

PHILADELPHIA, AUGUST 24, 1839.

We extract a part of a letter from our friend, Dr. Paul F. Eve, to the Editor of the Southern Medical and Surgical Journal, relative to the statistics of amputations in the Pennsylvania Hospital. We regret that we differ in many respects from the writer.

The statistics of amputations published by Dr. Norris are, we believe, the only ones published

in this country; they embrace a period of several years, and were performed by men of high surgical attainments in our admirably conducted hospital. Now, what do they prove? Simply that the mortality after amputation, under these circumstances, is much greater than is generally supposed; and, therefore, the operation is dangerous in the hospitals of America, as well as in those of Paris, although to a less degree in the former than in the latter. Before these statistics were published, the impression in the minds of most surgeons at Philadelphia was, that amputations were almost always successful. This was the conviction of the surgeons of the Pennsylvania Hospital as well as of others, and is probably the universal belief in the minds of men who rely on recollection only. A few years since, when we were connected with the hospital, a friend of ours at the Hôtel Dieu of Paris, wrote to inquire what was the proportionate mortality at the two hospitals. By looking over the cases, we found that with us it was at that time extremely large, and that the patients were either carried off by purulent absorption and its attending fever, or died of the immediate consequences of the operation, or of the disease which had required it. The mortality at that time was much above the average; nevertheless, it is never inconsiderable in patients placed under similar circumstances.

The only circumstances unfavourable to the recovery of the patients at the Pennsylvania Hospital, are—1st, the peculiar influence of the atmosphere of the institution, which occasionally gives rise to erysipelas and to purulent absorption, which is in some way connected with it; and, 2d, the late period at which the surgeons perform some of the amputations.

As to the first cause, it will, in all probability, never be entirely removed, but may be obviated, in a considerable degree, by avoiding operations, unless of indispensable necessity, where erysipelas prevails. The second cause is altogether a matter of opinion; there does exist amongst the surgeons of Philadelphia, a strong repugnance to the performance of amputations. This, in itself, is most praiseworthy, and undoubtedly is the means of saving not a few limbs, which would otherwise be lost; it may be, that it is occasionally carried too far. Nevertheless, the motives which dictate it are in accordance with humanity and sound surgical science.

The comparison with the French hospital practice and that of the American surgeons, is often made,—always greatly to the disadvantage of the former. We are quite aware that there are well grounded objections to some points of practice connected with French surgery; still, the great causes of the mortality after simple surgical operations, such as amputations, are certainly the great size of the wards in which the patients are placed, or at least the imperfect ventilation which is there practicable, and the miserable constitutions of many of the subjects. It was a matter of common remark to us, that the mortality was much less at the hospitals of the provincial towns than those of Paris, and less considerable at the hospitals situated in the suburbs of Paris, than those of the central parts of the town. This fact, in a great degree, explains the causes of the mortality, and proves that it is unjust to compare the success in private practice with that met with in the patients of our hospitals.

The statistics of Dr. Norris are of great value, because they are drawn up in accordance with strict observation, and bring out the unsuccessful cases into prominent relief, instead of keeping them carefully out of sight. Hence, full reliance may be placed upon his conclusions.

The very favourable reports of surgical practice which are occasionally published in this country, have always been drawn up, as far as we know, with the design of giving the true results; but we fear that the sensitive dread of confessing the failure of operations, has sometimes led surgeons to deceive themselves as to the results,—that is, they forget the unsuccessful cases, and remember only those which terminated well.

At least, this is the conclusion we formed from the reports of Dr. Norris, which, if we are not mistaken, were different from the impression which the author had previously received.

"M. Velpeau, in preparing the second edition of his Medicine Operatoire, wrote to Dr. Mott, requesting him to give some idea of the success of American surgeons. This Dr. Mott soon furnished; but M. Velpeau, I learn from his chief interne, M. Perischaud, does not give credit to it. He says this is contradicted by the statistics of Dr. Norris, one of the surgeons of the Pennsylvania Hospital. I recollect being impressed with the great error which Dr. Norris' statement was calculated to produce, by those who take it as the basis of success of amputations in the United States. It no more conveys a correct history of American surgery on this, than it does on any other subject. No surgeon of our country will consent to its being a correct foundation of statistics in surgical practice. All it can pretend to, and all that Dr. Norris undoubtedly intended by it, was the practice of the Pennsylvania Hos-

pital, and nothing more. I respect the surgeons of this charitable institution, but I am sure they even willacknowledge that they erred, and that greatly, though on the side of mercy, in delaying amputations during the period referred to by Dr. Norris. Who, in reading these statistics, will admit them as correct, as applied to the United States? And these being the only ones yet published in our country, it is not astonishing that a man of M. Velpeau's industry and penetration, should have noticed the contradiction to it in Dr. Mott's letter to him."

CHARACTER OF THE DISEASES OF THE PRESENT SEASON AT PHILADELPHIA.

The present season has offered no prevailing disease, other than those which are incident to the summer, such as cholera infantum, dysentery, and intermittent and remittent fever. The cases of remittent and intermittent have thus far been decidedly more numerous than they have been for several years past, and all that have offered themselves in our practice have been characterized by an extraordinary degree of prostration and feebleness of both nervous and circulatory system. The pulse is uniformly slow throughout a great part of the affection, but especially at the period of remission and of intermission, when it sinks to fifty or sixty in the minute. In no one case that we have yet seen, has the pulse offered the character of an inflammatory disorder, or one characterized by a strong, laboured action of the vascular system.

We have thus far treated about twenty cases without loss, nor have they generally been protracted. Some of them terminated in eight days, others at the end of a fortnight.

The mode of treatment we have found necessary is in accordance with the peculiar constitution of the period. In no one case was bleeding necessary; on the contrary, it always seemed inappropriate; purging was directed very moderately, and at the commencement. The purgative was generally calomel, combined with rhubarb. The purgative was repeated in a very small proportion of cases, and, after the first dose, consisted simply of a light laxative.

During the course of the disease, the remedies consisted of the mild diaphoretics, especially the spirit of mindererus, and preparations of quinine, as early as possible. The quinine did not agree with some of the patients in whom the disease was less distinctly remittent; but by suspending its use for a day or two, and again recurring to the diaphoretics, we were always able to resume it with good effect. We have not treated any case of a remittent form without quinine, but the milder cases would doubtless have passed off without any specific treatment. When the liver and spleen were much enlarged, a grain of blue mass was combined with two grains of quinine, and given every one or two hours.

The patients, after their recovery, remained for a long time extremely feeble, and, as usual, the spleen and liver were somewhat enlarged. These symptoms were combated by quinine and some preparation of iron, such as the carbonate and phosphate, and occasionally by infusions of serpentaria and cinchona. When gastritis occurred as a complication, it was removed by the usual remedies, such as cups to the epigastrium, &c.

It is extremely probable that the constitutional tendency of the remittent diseases of this summer extends much further than Philadelphia, and much injury may result from adopting too active, or, rather, too debilitating a treatment. With us the fevers in a few cases were attended with so much prostration as to require wine-whey, or some stimulant of the kind, in addition to the preparations of cinchona. We should be glad to learn from our correspondents the results of their experience on this subject.

CLINICAL REPORTS.

PENNSYLVANIA HOSPITAL.

List of Accidents admitted into the Pennsylvania Hospital, from July 31st to August 14th, 1839, inclusive.

[Reported by HENRY WHEATON RIVERS, M.D., Resident Surgeon.]

A CASE of ununited fracture of both bones of the arm, about their middle. This accident happened about three weeks previous to the patient's entering the hospital, and had been treated in the country during the first two weeks; after which time he came to town, and was under no treatment until he came into the hospital, when it was found that the bones had not united, and that considerable deformity had taken place by their projection inwards. The treatment consisted in applying a compress to the fractured ends of the bones, a splint on the under side of the arm extending to the ends of the fingers, and a bandage firmly applied. The deformity is much less at present, and the patient is doing well.

A case of oblique fracture near the lower end of the radius, caused by a fall on the hand. Treated by a compress over the fracture, two splints, and roller; doing well.

A case of laceration of the hand, by being caught in the machinery of a paper mill; the

hand was torn off, leaving nothing but the thumb, which was also badly lacerated. Amputation was performed above the wrist, immediately upon his coming into the house. The ligatures have all come away, and the stump is cicatrizing very well.

A case of lacerated wound of the scalp, with contusion of the left side, from a beating received with a porter bottle. There being considerable hæmorrhage from the wound of the scalp, it was found necessary to use a compress and double-headed roller, which suppressed it effectually. Cold was applied to the head, and six wet cups to side. Discharged cured, five days after the accident.

A case of dislocation of the jaw, caused by yawning, reduced in the usual way.

A case of fracture of the acromion process of the scapula, with partial dislocation of the head of the humerus forwards, from a fall directly upon the back of the shoulder. The dislocation was reduced; but owing to the patient's unwillingness to remain in the house, nothing further was done. The treatment in this case would have been similar to that of fracture of the clavicle.

A case of contusion of the back, with displacement of one or more of the inferior dorsal vertebræ, occasioning paralysis of the lower extremities, bladder, &c.

A case of punctured wound of the finger, from a fish-hook, which was remaining in. It was extracted by first cutting off the flattened end of the shank to which the line is attached, passing the point of the hook through the skin, and drawing it out in that way.

A case of contusion of the leg and ankle, with slight laceration, produced by a fall from a dray. Treated by elevating the limb on an inclined plane, leeches, and cold applications.

A case of punctured wound of the finger, from a fish-hook. This boy was brother to the patient whose case is reported above. The hook was extracted in the same way.

A case of lacerated wound of the scalp, accompanied by one of the right buttock also, caused by a fall from the top of a three story house. The wound of the scalp was dressed with adhesive strips, and cold applications,—and that of the buttock, which was about four inches long, was drawn together with sutures.

A case of compound and comminuted fracture of both bones of both arms, together with a lacerated wound of the scalp, from a fall from a three story window. This patient was a female, æt. sixty-seven, and was subject to fits of somnambulism, under which it was supposed she was labouring at the time of the accident. The scalp was dressed with lint, wet in cold water, the arms put in splints, with the view of making her more comfortable, and a large opiate given. Died twenty-four hours after the accident.

A case of compound dislocation of the second phalanx of the middle finger, which was thrown back upon the first. Reduced by making extension with a narrow, wet bandage, applied by a clove-hitch. Doing well.

A case of incised wound of the wrist, dividing the ulnar artery, and the tendon of the palmaris longus muscle, caused by a cut with a piece of sharp glass; both ends of the divided artery were secured immediately on his coming into the house, together with one other small artery; the parts were brought in apposition by adhesive strips, a splint extending from the elbow to the wound (over which a compress was placed) was applied, and the hand and fingers placed in a flexed position, and retained by means of a roller. Doing well.

A case of oblique fracture of the lower end of the humerus, extending through the internal condyle. This accident happened about ten days before his admission into the hospital, during which time he had received no treatment, and considerable deformity had taken place. The arm was dressed with an angular splint, the angle of which is to be changed every day or two, in order to reduce the deformity as much as possible.

A case of lacerated wound of the hand, caused by a blow from a barrel, which fell upon it. Dressed with a long splint, to prevent motion, and cold applications kept up by means of a syphon, to keep down inflammation.

The amputation of the leg of the boy æt. five, reported in the last number, is now well, the stump having completely cicatrized. The fracture of the clavicle is also well. The case of secondary hæmorrhage, for which the radial artery was taken up, has left the house, the wound having healed.

FOREIGN SUMMARY.

Observations on the Anatomical and Physiological nature of the Ergot of Rye and some other Grasses. By Edwin J. Quekett, Esq., F.L.S., &c., Lecturer on Botany at the London Hospital and Aldersgate School of Medicine.

[Continued fom page 532.]

Yet from this point, which is inseparable from the grain in the young state, it is most singular that in every kind of grass yet found ergotized, that the fungus should always burst through the tissue at this particular point, and at that particular time when the flower is about to expand. If it be a fungus solely, it ought certainly to burst forth as an ergot from the stem, or some other place on the several grasses, besides growing between and parting asunder two organs, which were as firmly united to each other in the young state, as the paleæ or glumes are to the same axis. Beside, the ergot, when matured like the ripe grain, slips out of the paleæ like a ripe filbert from its cupule, showing it has no organic connection at this period with the receptacle more than the grain had. Philippar's examination of the internal part seemed especially to strengthen his view of its being a fungus; for he describes the body of the ergot to be composed internally of branched short fibres,

and globules of various sizes, round and oval, which he considered the means of its reproduction. My own observations on the structure of the ergot differ somewhat from this, by believing that the fibres described are the boundaries of irregular cells, distorted by the fungoid matter, and not fibres at all; and the globules are not reproductive bodies, but those of a fatty oil which is contained in the interior of the cells, as seen fig. 7, in a transverse section magnified 1000 times. To witness these facts, take an ergot, scrape away with a knife all its black coat, so as to remove all the particles that adhere to its surface, then to make some very thin transverse slices, and put them on a slip of glass under the microscope: and when water is added to them, it speedily becomes turbid or milky, from the quantity of particles that have escaped from the sections; these particles, however, are not heavier than the water, as those on the exterior of the ergot are, but are lighter, and collect on the surface, from whence they can be removed like cream from the surface of milk. When magnified, these particles are found to be of vastly many sizes, some as large as 1-1000th of an inch in diameter, others so small as to be barely visible when viewed to the extent that optical powers can assist us, and appear, when magnified, 1-1000th linear, very like the globules in human milk. When the water in which the slices have been placed is heated, these minute globules liquefy and run together, forming either very large globules or numerous irregular masses; their primary form, by this operation, being completely disturbed, which would not have been the case had they been "seminules," or reproductive agents, as Philippar imagined. To observe the structure of the ergot, make some thin slices, then boil them in ether, which dissolves the fatty matter, and makes their structure become visible, which is to all appearances irregularly cellular, and not fibrous.

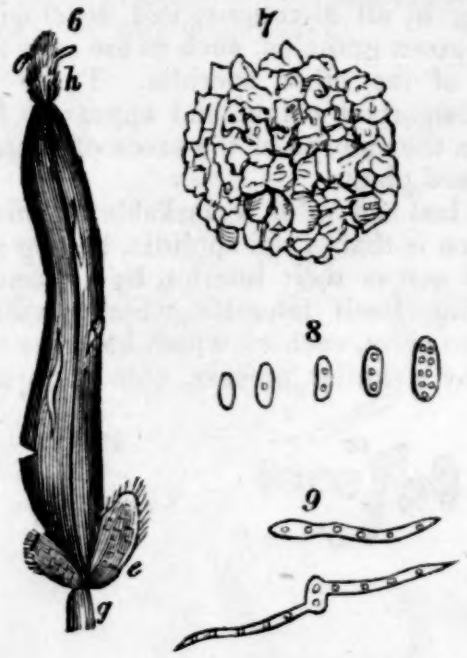
Another argument against the ergot being a complete fungus is, that the particles which are its reproductive agents are most numerous when it is young, and it continues its growth after their production has ceased, which is contrary to the usual law amongst this class of vegetable productions; for their efforts to live are only to develope the means for propagation, dying, as it were, the instant this action has been accomplished.

Besides these, Vauquelin's chemical analysis proves its dissimilarity in composition with the FUNGACEÆ, and even with Sclerotium—a genus of that order to which the ergot was assigned by Fée and De Condolle—by containing very different constituents, which are the following:—

Colouring matter, soluble in alcohol.
White oil, very abundant, sweet.
Violet matter, soluble in water.
Fixed phosphoric acid.
Azotized matter, very abundant and alterable.
Free ammonia, at 100° Reaumur.

Thus far the arguments against the ergot being a species of fungus are taken from the body itself; but by experiments and minute examinations of the particles which separate from its surface, or are found in the viscid fluid which lodges externally, additional proofs can be obtained that corroborate the former views of its nature.

When these particles are placed under a microscope, and magnified about 1000 times (linear) their minute structure becomes then discernible, and their shape is seen to be oval or elliptical, and occasionally a little contracted about midway, and contain several green granules, whose number varies in different particles; most frequently there are one, two, or three well defined spots in their interior, and occasionally there are as many as ten or twelve; and there can be no doubt that these minute bodies are the reproductive agents of a particular fungus, to which particles the term *sporidia* is applied, to characterize them, because their structure is unlike seeds, notwithstanding their office is the same. Various conditions of these are seen at fig. 8.



FIGS. 6, 7, 8 and 9.

The size of these sporidia, upon an average, is about the 1-4000th of an inch in length, and 1-6000th of an inch in diameter, and the number on each ergot is uncertain; but as so many have been rubbed from one specimen as would fill a square inch of surface, it is probable, from the above measurement of their size, that about twenty millions may be calculated as an average number on a full-sized specimen; and as an example of the extreme minuteness of organic matter, some of these sporidia contain eight or ten granules, which are so small that it would require 200 millions of such to cover the same surface, their size not being more than 1-50,000th part of an inch.

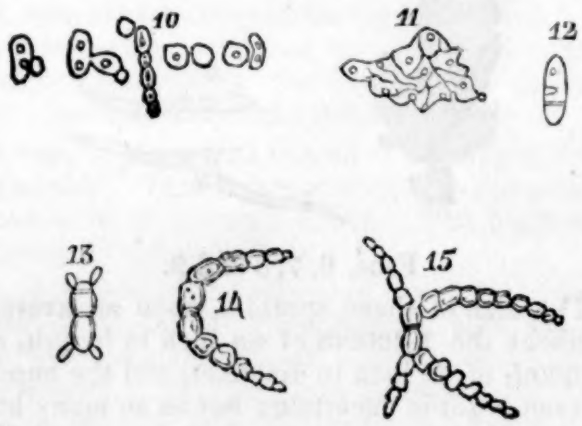
If these sporidia be kept moistened with water on any suitable surface, or on a piece of glass, which is covered with a thin piece of talc, after a time it will be observed that these minute bodies commence germinating in various ways, and with me have continued to grow in this manner nearly three months.

The most common method is that of the sporidia emitting a tube or tubes from some uncertain point or points, (fig. 9,) but generally opposite the spot where a green granule is lodged in the interior. This tube increases to an indefinite length, and contains throughout its interior similar green granules, arranged at short but generally equal distances, about as far from each other as they are in the interior of the sporidia; and I believe that this tube ultimately separates into fragments, constituting as many new ones.

In many other instances, the sporidia, instead of producing a tube, give origin, opposite a green granule, to a minute bud; this little point increases, and ultimately separates from the parent as a perfect sporidium, and frequently before its separation shows an indication of producing a similar one from itself, (fig. 10.)

Another way of increase amongst these singular germs is, that of the membrane composing the parietes of the sporidium breaking down, forming a flat patch, (fig. 11,) which keeps extending in all directions, and developing upon itself green granules, such as are seen in the interior of the other sporidia. These granules seem important points, and appear to be analogous to the embryo of the seeds of more highly organized plants.

The last and most remarkable manner of germination is that of the sporidia, having a septum formed across their interior, by a green granule extending itself laterally, which divides them into two parts, each of which becomes again divided by a similar process, seen at figs. 12, 13,



14, 15. By a repetition of this method there at last is formed a monilform filament, which, though simple in its origin, ultimately becomes branched, the branchlets most commonly radiating from a central collection of cellules. These filaments are the analogues of minute stems, and at a certain age give off, from innumerable points of their surface, little germs, which in a short time increase and become perfect sporidia, as seen figs. 16, 17 (*a a a*) which commence again in the several methods of germination just detailed. As the minute filaments belonging to one plant get what may be termed, ripe, the mass of cellules that have been developed about those first generated in the centre become to be considerably condensed and pressed together, as at fig. 17, (*b*,) so as to lose the distinct boundaries they originally possessed; and they begin to assume a brownish-yellow colour, and, in fact, look now exactly like a section of the body of the ergot itself.

Here, then, has been witnessed by daily examinations, the growth of these sporidia, which, being found on the ergot of every grass, are without doubt connected with the cause of its origin; these examinations show their various methods of germination, and their advancement to maturity and ultimate ripening, or producing the means of their reproduction; yet this minute plant does not measure more than 1-300th to 1-100th part of an inch in length or breadth.

The fact of having caused these minute plants to grow, independent or not connected with the body of the ergot, and without assuming any form in the least way similar to it, is the most convincing proof that the flocci, or arachnoid filaments, and the particles, before mentioned, occurring on the surface of the ergot, are no part of that body, but are the microscopic plants just described, which choose the grains of many grasses as the matrix of their developments, such plants belonging to the order of vegetables denominated Fungaceæ.

There are other proofs of the independent existence of the microscopic fungus, for it is found that it is not exclusively confined to the grain as a locality, but is observed to flourish on many other parts of the same grass, viz. in the interior and on the exterior of the anthers, on the paleæ, on the glumes, and on several parts of the rachis of the infected plant; but not occasioning there any exuberant growth of the part, for obvious reasons; because these parts have completed their development before the fungus makes its appearance; and their structure is not like that of the grain, which, at the period of the attack is exceedingly young, and just commencing to grow rapidly, and susceptible of impressions which can easily pervert its form and structure.

I conceive from the foregoing remarks that my examinations have proved that the ergot of the rye, as well as other grasses, is produced by a particular species of fungus, which developes itself upon or in the grain, whilst the latter is very young, causing its remarkable alteration from a healthy grain, in form, colour, chemical composition, and properties.

The method by which this singular production probably originates (for at present all respecting this part is uncertain) is, that the sporidia of this fungus are by some means introduced into the interior of the plant, and ultimately arrive at the grain, which they find the most suitable matrix for their development, or they are brought into contact with the young grain by some means (probably by the fluid) from without. In either case, when they come into contact with the grain, they lose no time in the work of reproduction, emitting their filaments through the tissue of the grain, and covering its body with multitudes of arachnoid filaments bearing sporidia, and apparently destroying its coats, as the matured ergot possesses no envelope.

Their presence communicates disease most frequently to the entire grain; sometimes, however, I have thought that the embryo only has been diseased, a part of the albumen remaining, along with the hairy tuft, on the apex of the ergot. This diseased action does not, I imagine, entirely deprive the grain of the power of growth, for it lives after the effects of the parasite have ceased: but it vitiates all its constituents, for neither starch nor gluten now exist, but instead, abundance of oil, which I suspect is produced by the grain, as none is seen from the microscopic plants whilst germinating in the way already described. As the ergot increases in size, it is made up partly of the diseased structure of the grain, and the fungic matter which has grown within it, which is like that observed when the parasitic plant grows unconnected with the grass, not being sporidia, but condensed cells such as compose the filaments, as at *b*, fig. 17.

To state my opinion, derived from experiments and examinations, which have been made and repeated again and again, in order to obviate every source of error arising from the manner in which they have been conducted, I would say, then, that I consider the body known as ergot to be a mass composed of the constituents of the diseased grain, mixed with fungic matter, occupying the place of the healthy ovary, of which can be observed some retained relics in its triangular shape, and the furrow on one of its sides, both conditions being those of the perfect grain also.

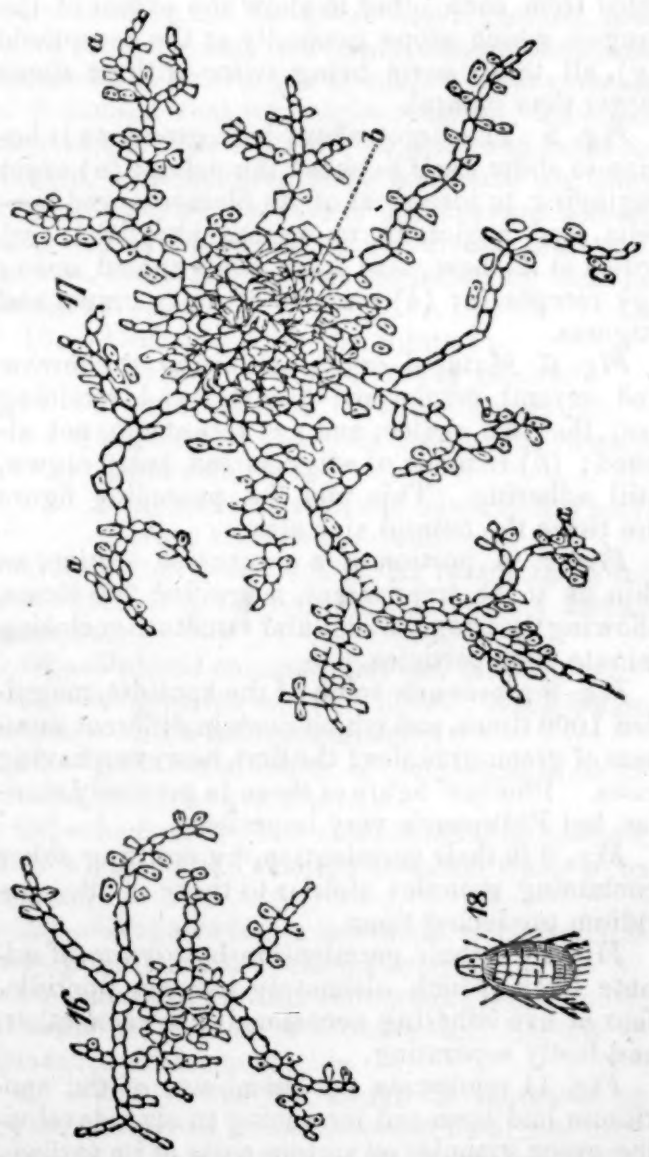
Since it has been, I trust, demonstrated that the ergot is no longer to be considered an independent fungus, it has become necessary to alter its previous botanical relations, by dismissing the former appellations, and giving a new one to the minute plant, which is the cause of this singular production.

From comparisons with the characters of the present little plant, and with those of British and foreign genera of FUNGACEÆ, it has been found so unlike any of them, as to deserve being made a new genus, to which I have given the title of *Ergotætia*;* and, after repeated examinations in the rye and other grasses, I have not hitherto found any material difference in the organization or characters of this parasite to warrant the making of those belonging to different grasses into different species, therefore I apply the specific term *abortans*† to the fungus found on the rye, and believe those on other grasses to be the same species.

This minute plant, from its structure and habit, will be classed in the suborder of FUNGACEÆ, *Coniomycetes* of Fries, and in the tribe of *Mucedines*.‡

Though many of these observations were primarily made with the elymus, because I had the plants in the growing state, yet the same experiments with the sporidia of the rye have been repeated, and with the same results, and the anatomy of the body of the ergot in both and in other grasses, seems to correspond in every respect.

This is a point which, as regards the goodness of the ergot of rye, is deserving mention in this place, from having found, in numerous instances, that the specimens have frequently been not much more than hollow cases, instead of being solid. On looking for the cause, it was found that these effects were produced by numbers of small acari, (fig. 18,) which devour the interior, thereby rendering such specimens nearly inert, and producing much powdery excrementitious matter about the ergot, similar to that observed with those species that dwell in cheese, or devour malted or other corn; therefore, the practice of keeping camphor, or some strongly smelling body with the ergot, is likely to be a preventive to the attacks of these tiny depredators.



heaped together, and lying upon the matrix, which is nearly the case with the parasite of the ergot, whose filaments do not often bear sporidia, or if so, not one-hundredth time so frequent as the sporidia develope one from another, forming a mass which completely invests the body of the ergot.

* From Εργωτη, *Ergota;* and αιτια, *origo*.

† The term applies directly to the fungus destroying the germinating power of the grain, and indirectly to the medicinal properties of the ergot.

‡ In Berkley's arrangement of the British Fungi, *Ergotætia* will be placed in the suborder *Hyphomycetes*, and in the tribe *Sepidoniei*, which is composed of plants having filaments not sporidiferous; the sporidia being

Explanation of the Figures.

Fig. 1 represents the young grain of rye twice its natural size, (*a*) being the ovary crowned with hairs, (*b*); (*cc*) the feathery stigmas; (*d*) the place of the embryo; (*ee*) the two scales at the base of grain; (*ff*) lines representing the position of the paleæ, which are seen in their natural condition in fig. 3; (*g*) the pedicel or receptacle to which the grain is attached.

Fig. 2 shows the ripe grain of rye, twice magnified; (*a*) embryo; (*b*) crown of hairs; (*cc*) shrivelled stigmas; (*d*) albumen, composing body of the grain; (*g*) pedicel.

Fig. 3 shows ripe grain in its natural position between the paleæ (*ff*).

Fig. 4 is intended to give a representation of the commencement of the formation of the ergot; but an accurate idea cannot be well given, on account of the minuteness of the particles and filaments composing the fungus: (*a*) is the ovary of the grain overrun with the fungus, which completely hides it from the view; (*b*) shows the fungus has cemented the anthers and the stigmas together; (*ee*) the two scales at its base, separated from each other to show the extent of the fungus, which stops generally at the receptacle (*g*), all these parts being twice or three times larger than natural.

Fig. 5. The ergot about half grown as it begins to show itself between the paleæ; (*a*) ergot beginning to lose most of its filaments and sporidia, and beginning to appear purplish; (*ee*) scales at its base, that have been spread open; (*g*) receptacle; (*h*) remains of hairy crown and stigmas.

Fig. 6. Matured ergot, exhibiting the furrow and several cracks and fissures, and retaining (*ee*) the two scales, and (*g*) receptacle, not altered; (*h*) remains of stigmas and hairy crown, still adhering. This and the preceding figure are twice the natural size also.

Fig. 7. A portion of a transverse section, so thin as to be transparent, magnified 700 times, showing the irregular, cellular structure enclosing minute fatty particles.

Fig. 8 represents some of the sporidia, magnified 1000 times, and which contain different numbers of green granules; the first, however, having none. Phœbus' figure of these is precisely similar, but Philippar's very imperfect.

Fig. 9 is their germination, by emitting tubes containing granules similar to those of the sporidium producing them.

Fig. 10 is their germination by giving off minute buds, which ultimately become sporidia, four or five adhering occasionally to each other, and lastly separating.

Fig. 11 represents the membrane of the sporidium laid open and increasing in size, developing green granules on various parts of its surface.

Fig. 12 shows the manner a sporidium is divided by a septum or septa, by the green granules extending themselves laterally; different states being observed in the present figure.

Figs. 13, 14, 15. Different stages of the same process.

Fig. 16. The fungus assuming a radiating form, and beginning to develope sporidia upon its branches.

Fig. 17. The fungus arrived at maturity, its centre showing a structure analogous to that seen in fig. 7, and its several branches loaded with sporidia. Figs. from 8 to 17 magnified 1000 times.

Fig. 18. The acarus which lives on the interior of the ergot, being about one-fourth the size of the cheese-mite; magnified 80 times.

Clinical Lecture on Hypertrophy of the Heart,—Dropsy,—Congestive Bronchitis,—Spurious Emphysema,—Cirrhosis,—Granular Kidney. By Robert Carswell, M. D.—Gentlemen: I have to lay before you to-day the history of the case of John Davis, admitted with extensive disease of the heart, anasarca, and bronchitis. This patient had been under our care rather more than a fortnight, and, hopeless as his case was deemed by us, died suddenly, as not infrequently happens in such cases, without any very obvious aggravation of the symptoms.

The *post-mortem* examination of the body has furnished us with a number of very interesting examples of pathological alterations in several organs. The heart, the principal and primary seat of the disease, has afforded an example of hypertrophy of great extent, uncomplicated with valvular disease, endocarditis, or pericarditis. The lungs furnish another among the many examples which we have already met with of the congestive form of bronchitis; and of that form of pulmonary emphysema to which I have on several occasions directed your attention, as accompanying this complication, but which I have said is not the emphysema of Laennec and other authors. It ought not to be called emphysema, as it is not accompanied by dilatation of the air-cells, a circumstance which constitutes the essential physical character of vesicular emphysema. It consists simply in *inflation* of the lung, from the gradual accumulation and retention of the inspired air; in congestive and other forms of bronchitis, caused by the presence of the inspissated bronchial secretion; the swollen state of the bronchial mucous membrane; and, probably, by a modified condition of the vital contractility of the lung itself.

The liver and kidneys, also, in this patient, have presented us with specimens of morbid appearances with which few are familiar, and which, consequently, are either overlooked, or so imperfectly or inaccurately described, as not to be made available to the practical or scientific study of medicine. I shall read you the history of the case, and a description of the post-mortem appearances, before offering you any further remarks.

John Davis, aged thirty-three; admitted 15th May; naturally of slight conformation; sanguine temperament; a carpenter; married, and has a family of seven children; of very intemperate habits, being addicted to spirit-drinking for two or three years before his last illness. His rela-

tions on his father's side, and his sister, are stated to have died of consumption.

Healthy until the age of nineteen, when he had spitting of blood, brought on by carrying heavy pieces of timber; it occurred to a great extent, and was preceded by violent coughing. He was then confined to his bed for three months, and was subjected to active depletion. He afterwards recovered; a slight cough and dyspnœa remained; and the spitting of blood recurred, to a slight extent, on any strong exertion. Four or five years ago had spitting of blood, but not to the same degree as on the first attack, and was again bled, and completely recovered. Had gout on several occasions two or three years ago.

Last September twelvemonth he caught cold from exposure while heated, followed by cough and copious expectoration, sometimes streaked with blood; and had also tightness of the chest and dyspnœa. Was again bled, and employed other depletive measures for three months, which reduced him much in flesh and strength. Has had frequent recurrence of the cough and dyspnœa on exposure to cold; health best during the summer. At the end of September had violent headach during the day, the pain constantly shifting to all parts of the head and face. On recovering from this, at the end of three weeks, was again affected with great dyspnœa and slight cough, increased on the slightest exertion. Was under medical treatment, during which he used a bath of hot brine for his feet, to which he attributed the swelling of these and of the ankles, which appeared the following morning. The œdema gradually extended up the legs; these were punctured in various places, from which a quantity of fluid has been continually oozing, but without any reduction of the size of the limbs. The œdema is attended with great tenderness and burning heat of the skin, tingling, and a feeling of tension; it has gradually extended along the thighs and abdomen.

Present symptoms.—Skin hot and dry; feet cold by day, hot at night; ascites; œdema of feet, legs, and parietes of abdomen. The former feel very tense, and pit deeply on pressure; the skin is of a pale, waxy aspect; excoriation of the legs from the discharge from the punctures; countenance anxious and pale; dimness of sight; hoarseness from recent cold; breathing short, and affected by slight exertion; orthopnœa; slight cough, and expectoration of a muco-purulent matter.

Physical signs.—Impulse of heart too strong and too extended; bellows-sounds at base of heart, first slight, second louder; a trace of morbid sound at apex, with first sound.

Respiration anteriorly puerile, and slightly sonorous in upper part of right lung; slightly mucous and feeble inferiorly; large muco-crepitant rattle all over anterior part of left lung; posteriorly, respiration in right lung distinct near the vertebral column, about the middle of the back, in the rest of the lung very feeble, (almost wanting,) and slightly sonorous; and a little mucous inferiorly; left lung, muco-crepitant rattle to the bottom; percussion dull, over a large extent, in cardiac region transversely, over a less extent perpendicularly; clear in both lungs anteriorly, but clearer in the right lung than in the left; posteriorly duller in the lower third on both sides; clear in the upper two-thirds; dulness over a less extent than usual in the region of the liver; the left side of the chest appears smaller than the right; pulse ninety; tongue clean and moist; appetite good; diarrhœa with tenesmus immediately after taking food; urine scanty, and high-coloured and scalding; hæmorrhoids, and occasional discharge of blood.

The diagnosis in this case was not difficult; the physical signs of hypertrophy of the heart were conspicuous, and the morbid sounds heard in the region of this organ rendered it probable that it was complicated with valvular disease. The anasarca and ascites were the obvious consequences of the obstacle to the venous circulation, and partly of the state of the lungs, in which we had bronchitis and spurious emphysema, as dependent on the diseased state of the central organ of the circulation. The extent of the primary disease, and its grave complications, rendered the prognosis extremely unfavourable, and afforded a slight chance of success to any means of treatment that we might employ. The free state of the bowels, and the suffering he experienced from hæmorrhoids, prevented us from having recourse to drastic purgatives, and induced us to place our chief reliance on diuretics; he was, therefore, ordered the following diuretic medicines:—

15.—Tinct. digitalis, ten minims;
Tincture of squills, twenty minims;
Nitrous spirit of ether, one drachm;
Solution of iodide of potassium, twenty-five minims;
Peppermint-water, one ounce and a half;
every six hours. Middle diet.

17.—Urine rather increased in quantity, and pale; specific gravity, 1010, acid reaction and albuminous.

18.—Ordered common diet and meat daily.

20.—Complains of great thirst. Soda water, an ounce and a half, occasionally.

21.—Solution of iodide of potassium to be increased to thirty-five minims.

22.—Less fever, but complains of flatulence. Half a pint of milk daily; the soda water to be omitted.

23.—Dyspnœa rather increased, and complains of palpitation on the least exertion.

24.—Better, but still very weak; pulse quick. A lotion of decoction of bark and tincture of opium for the hæmorrhoids.

25.—Better, but the cough is increased at night; complains of sickness and flatulence after food; bowels relaxed, and stools watery; urine less in quantity. Solution of iodide of potassium increased to forty-five minims, and to have
Extract of henbane, three grains;
Compound powder of ipecacuanha, five grains;
Calomel, two grains; every night.

27.—Great anxiety of countenance, and tremor

of the upper extremities; extreme debility; the cough and dyspnœa increased without the power to expectorate; pulse weak and slow.

28.—Early in the morning he complained of faintness and vertigo, and immediately after died.

Examination of the body twenty-six hours after death.

External appearance of the body.—Considerable œdema of the feet, legs, and thighs, and also of the penis and scrotum. Abdomen large, globular, tympanitic, except posteriorly, where the sound on percussion is dull, accompanied with slight fluctuation.

Chest.—The chest was first examined, in order to ascertain more correctly the relative position of the contained organs, which would have been altered by previously opening the abdomen, and allowing the escape of the effused fluid, together with the removal of the viscera.

On removing the anterior walls of the chest, the right lung was found in a state of full inflation; the left was much less distended, did not project forward like the right, and adhered intimately to the mediastinum, costal pleura, from the summit of the lung, down to about the fifth or sixth rib, and also to the pericardium and a portion of the diaphragm, by means of old, pale, cellular adhesions, some portions of which were in a fibro-cartilaginous state, where they united the upper lobe of the lung with the costal pleura. That portion of the pleural cavity on this, the left side, where there were no adhesions, contained about a pint of clear serosity. The right pleural cavity, the pulmonary and costal pleura of which were perfectly free and healthy, contained fully a pint and a half of a similar fluid.

The right lung, after its removal from the chest, and when held up in the hand, retained the same bulk which it presented when the chest was laid open. It felt extremely light, when compared with its great bulk,—did not present the dark venous colour of congestion, even posteriorly; and along the whole of its anterior margin was very pale, being, in this portion of its extent, much less vascular than natural. This portion of it, also, but particularly inferiorly, felt, when pressed, quite cottony, and yielded but very little crepitus. The greater part of the lung communicated a similar sensation, but in a less degree. No part of it, even the posterior and depending portions, could be said to be congested; nor was there even the usual œdematous state of these latter parts. The anterior, paler, and most inflated portions, contained, indeed, less moisture than in the natural state. Nowhere was there any trace of emphysema; I mean to say, no trace of dilatation of the vesicular structure of the lung was to be detected. The left lung, separated from its adhesions and removed, did not appear more than half the size of the right. It did not communicate the same cottony feel when pressed, and was slightly congested posteriorly.

The inferior portion of the trachea, and the bronchial tubes of the right lung, contained a large quantity of muco-puriform fluid, and the mucous membrane was greatly congested, and of a livid red colour. The bronchi of the left lung contained, also, a quantity of secreted fluid, chiefly of inspissated mucus, but was not congested.

Two or three of the bronchial glands on the left side contained a large quantity of cretaceous matter.

The pericardium contained between four and five ounces of clear serosity. The heart, at least double the natural size, occupied, transversely, a proportionate extent of the left side of the chest. It presented, on its external surface, at the apex, an opaline spot, about an inch and a half in breadth, presenting a rather rough surface; and a spot of a similar nature at the base of the heart, occupying a portion of the right ventricle and auricle, but double the extent of the other, and presenting a rougher and more unequal surface. The enlargement of the heart depended chiefly on hypertrophy of the left ventricle. The walls of this cavity, very firm, and paler than natural, were an inch in thickness towards the base of the heart, and at least half an inch at the apex; the cavity of the ventricle being enlarged, but not in proportion to the hypertrophy of the walls. The auricle on this side, not more capacious than natural, was, in some points, double the natural thickness. The left ventricle was rather large, its walls slightly hypertrophied; the musculi pectinati of the right auricle were largely developed, as well as the columnæ carneæ of the right ventricle; and the septum ventriculi thickened in proportion to the walls of the left ventricle. All the valves might be said to be perfectly healthy. The only preternatural appearance observed was a slight enlargement and hardness of the corpus aurantii of one of the sigmoid valves of the aorta. The endocardium was generally of its natural colour and transparency, except in some points of the mitral valve, at its base.

The right ventricle and auricle contained a large, flattened, rather solid, coagulum, consisting more of fibrine than blood. It passed from the auricle into the ventricle, and from the latter into the pulmonary artery, its two great, and several of its subdivisions. It adhered, or, rather, was firmly entangled between the musculi pectinati, the chordæ tendineæ and smaller columnæ carneæ. In the left ventricle and auricle the coagulum was much smaller, and composed chiefly of dark blood, partly fluid.

Abdomen.—Intestines greatly distended with air. Between two and three pints of clear serosity in the depending part of the cavity. Stomach, duodenum, and jejunum, contained a considerable quantity of the mucous secretion mixed with bright, yellow-coloured bile; the cœcum and transverse arch of the colon, a large quantity of semi-liquid fæcal matter of the same colour.

The mucous membrane of the stomach presented in several points, and particularly where it formed rugæ, a punctiform redness. The mucous membrane of the duodenum was almost entirely of a deep and somewhat punctiform red-

ness, and considerably thickened, and presented a round ulcer, about the size of a silver sixpenny-piece, midway between the pylorus and the orifice of the common bile-duct. The mucous membrane of the cœcum also presented a similar red colour, but much less in degree, and not general. In other portions of the intestine the mucous membrane did not present any preternatural appearance, except some congestion from depending position. The liver, the convex surface of which was on a level with the sixth rib, and adhered intimately to the diaphragm, presented externally the peculiar physical characters of cirrhosis. It was diminished in size, particularly the left lobe, and a number of flattened spheroidal bodies projected from its surface. These were of different sizes, varying from the size of a hemp-seed to that of a small split pea, and were much more numerous and conspicuous in some parts than in others. The liver felt harder than natural, and was of a dull, grayish-red colour. The whole of the interior of the organ presented the lobulated or tuberiform arrangement observed in the first stage of cirrhosis. The acini were grouped together in masses of various sizes, as seen on the exterior surface of the organ, and were separated from each other by a cellulo-fibrous tissue; and these, again, were divided into smaller ones by prolongations of the same tissue. The quantity of this tissue was greatest between the larger masses, and gradually diminished in their subdivisions amongst the acini. Its presence was, therefore, most conspicuous in the former situations, as a tissue foreign to the healthy structure of the liver, and distinguishable from it as well by its colour as its form and distribution. I shall take an early opportunity of pointing out to you the nature of this tissue, the manner in which it gives rise to the peculiar appearance of the liver named cirrhosis, the influence which it exercises on the portal circulation, and in the production of ascites. The spleen was considerably increased in bulk, probably twice the natural size. Both kidneys were small, slightly lobulated, very firm, and their proper covering opaque, thickened, and obscuring entirely the colour of the cortical substance, seen beneath in the natural state. When divided by a longitudinal section the cortical substance appeared rather pale, slightly granulated towards the circumference; and the tubular portion congested, accompanied by an indistinct appearance of its structure. On removing the serous covering of these organs, the granular appearance alluded to was much more marked, and was seen to be produced by closely-grouped, round bodies, of a whitish-gray colour, varying from the size of a mere point to that of a millet-seed. These were more closely set in some points than in others, and were rendered more apparent by the reddish-brown and somewhat vascular, unaffected, surrounding cortical substance. There were, likewise, a number of very small serous cysts, occupying, here and there, the external surface of both kidneys. The urinary bladder was healthy. The cellular tissue of the limbs presented, when cut into, the usual appearance found in mechanical œdema of this tissue. The brain was not examined.

With regard to these morbid alterations found after death, and the signs and symptoms by means of which we were enabled to detect their existence during life, it is necessary that I should make a few observations. The essential morbid condition of the heart was fully established, viz. that of great hypertrophy. The morbid sounds heard, and which were thought to depend, most probably, on valvular disease, were certainly produced by some other morbid condition of the heart, inasmuch as all the valves were found remarkably healthy. The rough patches observed on the surface of the heart were the only physical conditions which we met with likely to have occasioned them; and as they were situated in the regions of the heart where these sounds were heard, were, I am disposed to believe, the cause of them.

The morbid appearances found in the lungs, also corresponded with the physical signs which I have described. There was bronchitis, and there was spurious emphysema, or inflation of the right lung, marked by the clearer sound on percussion, and more fulness of the chest on this than on the opposite side. There was, however, hydro-thorax to a limited extent, and which, though indicated by dulness on percussion, was not named as depending on this state. The ascites was, of course, easily detected, although limited in extent; and, from the sound on percussion on the right side being clearer lower down than usual, although this might have depended on the inflated state of the lung, I thought it probable that there might be cirrhosis of the liver, a probability which was greatly increased by the intemperate habits of the patient. As the disease of the heart accounted fully for the ascites and anasarca, and as a coagulable state of the urine, with a low specific gravity, exists in dropsy of this nature, without disease of the kidneys, the pathological condition of these organs did not form an element in the diagnosis of this case. These organs, however, presented a marked example of the early stage of the granular kidney originally described by Dr. Bright.

The sudden cause of death in this case cannot excite your surprise when you reflect on the extent and quantity of the thoracic disease. The function of respiration ceased to be accomplished under a combination of causes. First, the accumulation of air, and the permanent inflation, particularly of the right lung, in the manner I have described; secondly, the obstacle caused by this to the circulation of the blood through the lungs, still more increased by, thirdly, the hydrothorax; and, lastly, the coagulation of the blood in the right side of the heart, which I am disposed to believe, from the appearance of the coagula, and the circumstances in which it occurred, took place previous to, and might have been the immediate cause of, death.

Before concluding, I may advert to the hæmop-

tysis which this patient experienced at an early period of his life, and which recurred on two or three occasions, at rather remote periods. The first and most severe attack followed violent muscular efforts in carrying heavy pieces of timber, and, I am disposed to believe, depended on bronchial, not pulmonary, hæmorrhage, or pulmonary apoplexy, as it is called. It is, also, equally probable that its occurrence was favoured, or that the predisposition existed, in consequence of previous disease of the heart. For hypertrophy of this organ is a frequent cause of hæmoptysis, particularly under the influence of the exciting causes which were in operation in this patient when it first occurred. Its subsequent occurrence obviously supervened on congestive bronchitis, of which he had several attacks, brought on by exposure to cold, and still more by the intemperate habits of the patient. That these, also, were complicated, on one occasion, with pleuritis, was shown by the old and dense cellular adhesions which existed so extensively on the left side of the chest. Lastly, I may remark that, in the history of the case of this patient, it is stated he lost several of his relations on his father's side, and his sister, from consumption. We did not find in the lungs any trace of tuberculous matter, or other alterations, dependent upon it, to afford us any evidence that he had had tubercular phthisis at an early period of life, at the age of 19, the period at which the hæmoptysis first took place, and to the presence of which the occurrence of hæmorrhage might have been ascribed. We found, however, evidence of tubercular disease having been present at a remote period in the bronchial glands. Several of these, situated along the course of the left bronchus, were completely filled with a hard, cretaceous-looking matter, such as is frequently met with in those who die of scrofulous disease of these and other organs of the body, and of tubercular phthisis. If the morbid condition which I have noticed was the consequence of scrofula, it is an example, among many which I have met with, of the curability of the disease, when confined to the lymphatic glands, established by the most unequivocal of all evidence,—that afforded by an examination of the affected parts after death.—*Lancet.*

Death from pumping Air into the Eustachian Tube.—An inquest was held in June last, by Mr. Wakley, coroner of Middlesex, on the body of an individual who died while undergoing an operation, which consisted in pumping air through the nostrils into the Eustachian tube. The following medical evidence relating to the subject, is found in the London Times of July 1st:

"Mr. James Reid deposed, that he found a thin layer of blood on the left side of the membrane of the brain, and globules of air under it, and in the small veins of the brain; that the left tympanum, or internal ear, had its lining membrane swollen, of red appearance, and there was a slight effusion of blood in it. From the known plethoric habit of the deceased, and from the fact of his having exerted himself at filling the air-pump before he was operated upon, he should say the cause of his death was apoplexy.

"Mr. Savage, lecturer on anatomy to Westminster Hospital, was next examined, and differed from the last witness, and stated that there was extravasated blood on both sides of the membrane, and that the tympanum of the right ear was affected as well as the left. He did not consider that deceased died of apoplexy, but that the injection of cold air through the Eustachian tubes was the primary cause of deceased's death. He knew that the instrument used by Dr. Turnbull would be affected by this opinion; but he did not think the operator in the case at all to blame, as he could not be aware of the nervous susceptibility of the patient.

"Mr. Liston, surgeon to University College Hospital, stated that he was present at the post mortem examination, at the request of the coroner, and the probability was that the deceased died in a continued fainting fit. He could not easily disconnect the forcible injection of cold air into the tympanum from the effect that followed it. In the region of the tympanum were a number of small nerves, connected with the most important one of the body, which, receiving an impression, would cause spasms, or other fatal affections of the heart. Nothing precisely satisfactory could be come to, on account of the decomposed state of the body."

A writer in the London Medical Gazette, and Lancet, recommends the observance of the following precautions, in the performance of the operation in question:

"Firstly. Under no circumstance ought the tube from the air-condenser to be accurately fitted to the catheter, one extremity of which is placed in the orifice of the Eustachian tube; but, as has been forcibly pointed out by the reviewer in the current number of the British and Foreign Medical Review, p. 95, the 'nozzle of the tube of the air-press should be held during the operation so loosely in the dilated end of the catheter, that there may be room for air to regurgitate.' By adopting this plan, although I have operated on my own ears many dozens of times, and upon patients many hundreds, I have never even produced emphysema, or any pain in the ear.

"Secondly. The condensed air must not be allowed to rush into the tympanum in the form of '*charges*,' but in a gentle and continued stream. Any one thinking of the peculiar and powerful effect produced in the ear, and over the whole of the head, during, and for some moments after, the distension of the cavity of the tympanum, by a forcible expiration with closed nostrils, can well imagine the result of a 'charge' from a powerful air compressor.

"Thirdly. No one ought to undertake the performance of the operation, who has not attained considerable dexterity and tact by the passage of instruments on the dead subject."